

We claim:

1. A sample holder comprising a body, of a material that is functionally transparent to at least some wavelengths of visible light, and functionally transparent to at least some wavelengths of infrared light, and that defines:
  - a. A first face, defining a region adapted to support a sample, where the first face is substantially planar in the region;
  - b. A second face, substantially parallel to the first face.
2. A sample holder as in claim 1, wherein the material is functionally transparent to near-infrared light.
3. A sample holder as in claim 1, wherein the material is functionally transparent to mid-infrared light.
4. A sample holder as in claim 1, wherein the region is adapted to support a biological sample.
5. A sample holder as in claim 1, wherein the region is adapted to support a non-biological sample.
6. A sample holder as in claim 1, wherein the shape of the body is compatible with contemporary infrared microscopes.
7. A sample holder as in claim 1, wherein the shape of the body is compatible with contemporary focal plane array systems.
8. A sample holder as in claim 1, wherein the shape of the body is compatible with contemporary optical microscopes.
9. A sample holder as in claim 1, wherein the dimensions of the body are compatible with contemporary optical microscopes.
10. A sample holder as in claim 1, where the body has a length of from 0.25 to 4 inches, a width of from 0.1 to 1.5 inches, and a thickness of from 0.01 to 0.1 inches.
11. A sample holder as in claim 10, wherein the body has a length of about 3 inches, a width of about 1 inch, and a thickness of about 0.04 inch.
12. A sample holder as in claim 10, wherein the body has a length of 0.25 inches to 2.5 inch, a width of 0.1 inches to 1 inch, and a thickness of 0.01 to 0.1 inches.

13. A sample holder as in claim 1, wherein the sample holder index of refraction is amenable to attenuated total internal reflection of infrared light.
14. A sample holder as in claim 1, wherein the sample holder index of refraction is from 1.3 to 3.5.
15. A sample holder as in Claim 1, wherein the material comprises: Barium Fluoride, Caesium Iodide, Calcium Fluoride, Cubic Zirconium, Diamond, Lithium Fluoride, Magnesium Fluoride, Potassium Bromide, Potassium Chloride, Quartz, Sapphire, Silver Bromide, Silver Chloride, Sodium Chloride, Thallium Bromide, Thallium Bromo-Iodide, Thallium Bromo-Chloride, Zinc Selenide, Zinc Sulfide, Multispectral Zinc Sulfide.
16. A sample holder as in Claim 1, wherein the material separating the first and second faces defines first and second opposing edges, where the first and second opposing edges intersect the first face along substantially parallel lines, and wherein the first and second edges are oriented at first and second angles, respectively, to the first face.
17. A sample holder as in claim 16, wherein the first and second angles are about 90 degrees.
18. A sample holder as in claim 16, wherein the first and second angles are substantially equal.
19. A sample holder as in claim 16, wherein the second edge intersects the second surface at an angle substantially the same as the first angle.
20. A sample holder as in claim 16, wherein the first angle is in the range from 10 to 90 degrees.
21. A sample holder as in claim 16, wherein the first angle is about 50 degrees.
22. A sample holder as in claim 16, wherein the first and second edges are finished to an optically smooth surface.
23. A sample holder as in claim 16, wherein the first and second edges are treated with at least one of:
  - a. an antireflective coating;
  - b. a reflective coating;
  - c. a selective spectral transmission coating.
24. A sample holder comprising:
  - a. a frame,

- b. a sample interface mounted with the frame, where the sample interface comprises:
    - i. a material that is functionally transparent to at least some wavelengths of visible light and functionally transparent to at least some wavelengths of infrared light, and that defines
    - ii. a first face, defining a region adapted to support a sample, where the first face is substantially planar in the region;
    - iii. a second face, substantially parallel to the first face.
- 25. A sample holder as in Claim 24, wherein the shape of the frame is compatible with contemporary optical microscopes.
- 26. A sample holder as in Claim 24, wherein the dimensions of the frame are compatible with contemporary optical microscopes.
- 27. A sample holder as in Claim 24, where the frame has a length of from 1 to 4 inches, a width of from 0.5 to 1.5 inches, and a thickness of from 0.01 to 0.1 inches.
- 28. A sample holder as in Claim 27, wherein the frame has a length of about 3 inches, a width of about 1 inch, and a thickness of about 0.04 inch.
- 29. A sample holder as in Claim 24, wherein the sample interface index of refraction is amenable to attenuated total internal reflection of light in the mid-infrared region.
- 30. A sample holder as in Claim 24, wherein the material comprises: Barium Fluoride, Caesium Iodide, Calcium Fluoride, Cubic Zirconium, Diamond, Lithium Fluoride, Magnesium Fluoride, Potassium Bromide, Potassium Chloride, Quartz, Sapphire, Silver Bromide, Silver Chloride, Sodium Chloride, Thallium Bromide, Thallium Bromo-Iodide, Thallium Bromo-Chloride, Zinc Selenide, Zinc Sulfide, Multispectral Zinc Sulfide.
- 31. A sample holder as in Claim 24, wherein the material separating the first and second faces defines first and second opposing edges, where the first and second opposing edges intersect the first surface along substantially parallel lines, and wherein the first and second edges are oriented at first and second angles, respectively, to the first surface.
- 32. A sample holder as in Claim 31, wherein the first and second angles are about 90 degrees.
- 33. A sample holder as in Claim 32, wherein the first and second angles are substantially equal.

34. A sample holder as in Claim 31, wherein the second edge intersects the second surface at an angle substantially the same as the first angle.
35. A sample holder as in Claim 31, wherein the first angle is in the range from 10 to 90 degrees.
36. A sample holder as in Claim 31, wherein the frame defines an opening, wherein the opening is adapted to mount with the sample interface leaving space between the frame and the sample interface adjacent the first and second edges.
37. A sample holder as in Claim 36, wherein the space accommodates substantially unobstructed passage of light to the sample interface.
38. A sample holder as in Claim 36, wherein the sample interface mounts with the frame using ledges on the frame, clips mounted with the frame and engaging the sample interface, clips mounted with the sample interface and engaging the frame, an interference fit of the frame and the sample holder, an adhesive in contact with the sample holder and the frame, or a combination thereof.
39. A sample holder for cancer analysis, comprising a body of a material that is functionally transparent to at least some wavelengths of visible light, and functionally transparent to at least some wavelengths of infrared light, where the body defines:
  - a. A first face, defining a region adapted to support a sample comprising biological material, where the first face is substantially planar in the region;
  - b. A second face, substantially parallel to the first face.
40. A cervical cancer screening apparatus, comprising:
  - a. A sample holder, comprising a body of a material that is functionally transparent to at least some wavelengths of visible light, and functionally transparent to at least some wavelengths of infrared light, the body defining:
    - i. A first face, defining a region adapted to support a sample comprising cervical cells, where the first face is substantially planar in the region;
    - ii. A second face, substantially parallel to the first face.
  - b. Means for directing light to the sample holder;

- c. Means for collecting light after interaction with a sample supported by the sample holder;
- d. Means for analyzing the collected light to determine a characteristic of the sample related to cervical cancer.